Chapter 5

Editors

5.1 Introduction to map editors

In a map window, map editors can be used to edit features of raster, polygons, segment or point maps.

With the pixel editor, you can:
- edit the class names, IDs, or values of pixels in a raster map.

With the polygon editor, you can:
- edit the class names, IDs, or values of polygons, and
- create labels of polygons,
- apply labels to polygons,
- extract segments.

With the segment editor, you can:
- insert segments and delete existing ones,
- edit the class names, IDs, or values of segments,
- change the shape of segments,
- split and merge segments, and
- check segments and polygonize segments.

With the point editor, you can:
- insert new points and delete existing ones,
- edit the class names, IDs, or values of points, and
- move points to a new position.

The polygon, segment and point editor can be used with the mouse pointer on the screen, and with the digitizer cursor when a paper map is stuck on a digitizer tablet. To set up a digitizer and to start digitizing, see Help topic How to set up a digitizer.

5.2 Pixel editor

5.2.1 Functionality

With the pixel editor, you can edit the class names, IDs or values of pixels in a raster map. The pixel editor has one mode, Select mode, to select pixels of which you want to change the class name, ID or value. The pixel editor has a menu bar, a context-sensitive menu, and a button bar.

To start the pixel editor
To edit an existing raster map, display a raster map in a map window, open the
Edit menu in the map window, choose Edit Layer, select the raster map layer you
want to edit. For more information, see How to edit point, segment, polygon, and
raster maps. Dependent raster maps cannot be edited: first break the dependency
links in the Properties dialog box of the map.
When the editor is started, the mouse pointer appears as a hand.

To zoom in on the map
Zoom in on the raster map for instance by clicking the Zoom In button on the
button bar. When you zoomed in *deeply*, the pixel values, class names or IDs of the
pixels are displayed. For more information, see How to zoom in on maps.

Select mode to select pixels
The pixel editor has one mode, Select mode, to select pixels of which you want to
change the class name, ID or value. In the Select mode, the mouse pointer appears
as a hand. You can select one or more pixels by clicking them or dragging a box
around them, in order to change their class name, ID, or value.
- to select a pixel, click it; or move the pixel selection cursor with the arrow keys
  on the keyboard and press the space bar;
- to select all pixels within a selected area: drag a box with the left mouse button
  and all pixels in the box are selected;
- to add pixels to a selection: press and hold down the Ctrl key and click the other
  pixels you want to select. When finished, release the Ctrl key.
- to clear a part of a selection: press and hold down the Ctrl+Shift keys, then
  click previously selected pixels or drag a box around pixels: these pixels are
  deselected. When finished, release the Ctrl+Shift keys.
- to toggle between select and deselect: press and hold down the Shift key, then
  click pixels or drag a box around pixels: selected pixels are deselected, and non-
  selected pixels are selected. When finished, release the Shift key.

To change the value of selected pixels
Depending on the domain of the raster map that you are editing, you can change
the class name, identifier or value of selected pixels:
- double-click a pixel and select a class name, or enter an identifier or a value, or
- select one or more pixels, and select Edit from the Edit menu or from the
  context-sensitive menu, or press Enter on the keyboard. In Edit dialog box that
  appears, select a class name, or type an identifier or a value.

For more information, see Pixel editor : Edit selection. All changes you make are
immediately stored in the raster map.

To copy pixels into the clipboard
You can copy selected pixels with their coordinates and class names, IDs, or values
to the clipboard. Select the pixels you want to copy and choose Copy from the Edit
menu. For more information, see Pixel editor : Copy.

To paste pixels from the clipboard
You can paste pixels, points, or nodes and intermediate point of segments and polygons from the clipboard into the pixel editor.
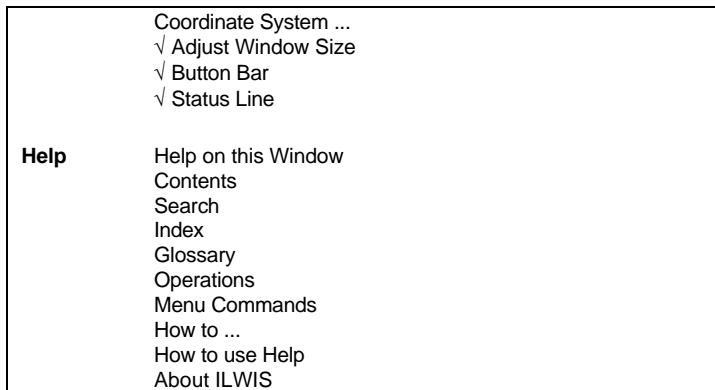For more information, see Pixel editor : Paste.

To exit the pixel editor
To exit the pixel editor, choose the Exit Editor command on the File menu or from the context-sensitive menu. You can also click the Exit Editor button in the button bar; you return to the map window. When you double-click the Control-menu box the window is closed.
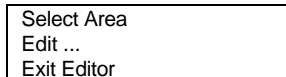
For more information, see also Appendices : Keyboard shortcuts and Appendices : Mouse functions.

5.2.2 Pixel editor Menu commands

File	Exit Editor	
Edit	Cut	
	Copy	
	Paste	
	Delete	
	Edit ...	
	Legend	
Layers	**Add Data Layer**	Raster Map ...
		Segment Map ...
		Polygon Map ...
		Point Map ...
	Add Annotation	Text ...
		Legend ...
		Grid Lines ...
		Graticule ...
		Box ...
		Scale Bar ...
		North Arrow ...
		Bitmap or Picture ...
	Display Options	*select layer*
	Layer Management	
	Background Color ...	
	Double-Click Action ...	
Options	Entire Map	
	Zoom In	
	Zoom Out	
	No Zoom	
	Redraw	
	Measure distance	
	Larger	
	Smaller	
	Extend Window	Extend by Percentage ...
		Extend by Coordinates ...

	Coordinate System ...
	√ Adjust Window Size
	√ Button Bar
	√ Status Line
Help	Help on this Window
	Contents
	Search
	Index
	Glossary
	Operations
	Menu Commands
	How to ...
	How to use Help
	About ILWIS

Context-sensitive menu

Select Area
Edit ...
Exit Editor

5.2.3 Pixel editor Button bar

The button bar of the pixel editor largely resembles the button bar of a map
window; there is an extra button to exit the editor.

The following actions can be performed:

Entire Map: Displays the entire map in the map window.

Zoom In: Zooms in on a selected spot or area in the map. The mouse pointer
changes into a magnifying-glass. Click to zoom in on a spot of interest, or drag the
pointer from one corner of interest to another (the mouse pointer changes into a
little box).

Zoom Out: Zooms out directly from the center of the displayed map with a factor 2.

Larger: Enlarges the size of the window with a factor 2. If this would not fit on
your screen, this button is empty.

Smaller: Reduces the size of the window with a factor 2.

Redraw: Redraws the contents of the map window.

Exit editor: Leaves the editor and keeps all changes.

The button bar can be hidden or shown with the Button Bar command on the
Options menu. If the action of a certain button cannot be performed at a certain
moment, the button appears gray.

5.3 Polygon editor

5.3.1 Functionality

The polygon editor is used to edit a polygon map. To create a polygon map, first digitize your segments with the segment editor and then polygonize the segment map in the segment editor. With the polygon editor, you can only edit the class names, IDs or values of polygons. The polygon editor has a menu bar, a context-sensitive menu and a button bar.

You can edit polygons with the mouse pointer on the screen but you can also use the digitizer cursor when a map is stuck on your digitizer tablet.
When you want to use the digitizer for the first time, you may have to setup the digitizer or reference the map. For more information, see also How to setup a digitizer and start digitizing.

When the digitizer is active, the Edit Polygons menu of the digitizer also appears. When the digitizer is not active, reference your map again. Depending on the digitizer set up, the numbers noted in front of a command on a digitizer menu, correspond with a button on your digitizer cursor (see How to set up a digitizer). To select a command, press the corresponding button. For a flowchart of the different digitizer menus, see Appendix : Flow charts of digitizer menus.

Further, in any map editor you can always use existing maps as a background by adding these maps as other data layers to the window (see How to digitize or How to add extra data layers to a map window).

To edit a polygon map
To edit a polygon map, display the polygon map in a map window, open the Edit menu, choose Edit Layer, and select the polygon layer from the cascading menu. You can also click a polygon in the Catalog with the right mouse button and then select Edit from the context-sensitive menu. For other methods, see How to edit point, segment, polygon, and raster maps.

Dependent polygon maps can not be edited: first break the dependency links in the Properties dialog box of the map.

When the polygon editor is started, a backup of the original polygon map is automatically made; the backup has almost the same name as the original polygon map. Only the first character is replaced by a hash (#).
When the Polygon editor is started, the mouse pointer appears as a hand. When the digitizer is active the Edit Polygons menu of the digitizer also appears.

Working with the mouse

To zoom in on the map
You can zoom in on the polygon map by for instance clicking the Zoom In button in the button bar. For more information, see Map window : zoom in.

Selecting polygons
You can select one or more polygons by clicking them, in order to change their class name, ID, or value.
- to select a polygon: click it.
- when you double-click a polygon, you can immediately change the class name, ID, or value of the polygon.
- to add polygons to a selection: press and hold down the Ctrl key and click the other polygons you want to select. When finished, release the Ctrl key.
- to clear a part of a selection: press and hold down the Ctrl+Shift keys, then click previously selected polygons: these polygons are deselected. When finished, release the Ctrl+Shift keys.
- to toggle between select and deselect: press and hold down the Shift key, then click polygons: selected polygons are deselected, and non-selected polygons are selected. When finished, release the Shift key.

Editing selected polygons
Depending on the domain of the polygon map that you are editing, you can change the class name, identifier or value of selected polygons:
- double-click a polygon, or
- select one or more polygons, and press Enter, or
- select one or more polygons, and select Edit from the Edit menu or from the context-sensitive menu.

In the dialog box that appears, select a class name, or type an identifier or a value. Polygons in a polygon map that uses an identifier domain can only be edited individually.

When you enter an identifier that is not yet present in the domain that the map is using, the identifier is automatically added to the domain. When you want to enter a class name, a list of the classes which are already in the domain appears in a text box. You can select an existing class, a question mark ? if the polygon is undefined, or <**new**> to create a new class which will be automatically added to the domain. In maps using a value domain, you cannot enter values that do not fit in the value range of that domain. For more information, see Polygon editor : Edit selection.

Working with the digitizer

When in the following part is written that you have to press e.g. the Change Window button, this means that you have to press the cursor button of your digitizer cursor, which corresponds with the number in front of the Change Window option in the digitzer menu. In the example, this is the cursor button corresponding with 2:

```
  ═│    Edit Polygons

0  ○ Edit Value
1  ○
2  ○ Change Window
3  ○
```
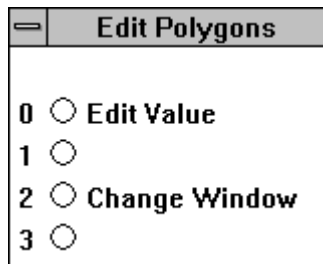
Editing a selected polygon

Locate the digitizer cursor on the polygon you want to edit. Press the Edit Value button to open a dialog box. In the dialog box, the area and length of the polygon are displayed; depending on the domain of the map that you are editing, you can enter a new class, ID or value.

To change the window

Press the Change Window button. Move the cursor to the first corner of the area you want to zoom in. Press the 1st Point button, you now see the zoom in box tied to the first point. Move the cursor to the 2nd position of the area you want to zoom in. Press the 2nd Point button, to zoom in on the area. To display the entire map after a zoom in command, press the Entire Map button. See also Appendices : Flow charts of digitizer menus.

Other options

To customize the polygon editor

When you choose Customize from the Edit menu or from the context-sensitive menu, you can among others indicate whether to use Autosnap or not and choose the colors in which you want to see your polygon boundaries. For more information, see Polygon editor : Customize.

Extract segments

To extract all segments from the polygon map and create an editable segment map, select Extract Segments from the File menu. For more information, see Polygon editor : Extract Segments.

Create labels

To create an editable point map in which each polygon has a label point, select Create Labels from the File menu. For more information, see Polygon editor : Create Labels.

Apply labels

To apply point labels to the polygons, select Apply Labels from the File menu. For more information, see Polygon editor : Apply Labels.

To exit the polygon editor

To exit the polygon editor, choose the Exit Editor option on the File menu or from the context-sensitive menu or click the Exit Editor button in the button bar. When you double-click the Control-menu box, the window closes. All changes you make in the polygon map during a session are continuously stored.

For more information, see also Appendices : Keyboard shortcuts and Appendices : Mouse functions.

5.3.2 Polygon editor Menu commands

File	Undo all changes
	Create Labels...
	Apply Labels...
	Extract Segments...
	Customize
	Exit Editor
Edit	Copy
	Edit ...
Layers	*see Pixel editor*
Options	*see Pixel editor*
Help	*see Pixel editor*

Context-sensitive menu

| |
| Select Area |
| Edit ... |
| Customize |
| Exit Editor |

5.3.3 Polygon editor Button bar

The button bar of the Polygon editor has the same buttons as a normal map window and some extra buttons for the different modes in the Polygon editor and a button to exit the editor.

The following actions can be performed:

Entire Map: Displays the entire map in the map window.

Zoom In: Zooms in on a selected spot or area in the map. The mouse pointer changes into a magnifying-glass. Click to zoom in on a spot of interest, or drag the pointer from one corner of interest to another (the mouse pointer changes into a little box).

Zoom Out: Zooms out directly from the center of the displayed map with a factor 2.

Larger: Enlarges the size of the window with a factor 2. If this would not fit on your screen, this button is empty.

Smaller: Reduces the size of the window with a factor 2.

Redraw: Redraws the contents of the map window.

Exit editor: Leaves the editor and keeps all changes.

The button bar can be hidden or shown with the Button Bar command on the Options menu. If the action of a certain button cannot be performed at a certain moment, the button appears gray.

5.4 Segment editor

5.4.1 Functionality

The segment editor is used to create a segment map with digital line features. To create a polygon map with digital area features, first digitize segments with the segment editor, then polygonize the segment map in the segment editor into a polygon map.

In the segment editor you can work with the mouse and the digitizer apart or simultaneously.
The segment editor has a Select mode, Move Points mode, Insert mode and Split/Merge mode. The segment editor has a menu bar, a context-sensitive menu, and a button bar.

With the segment editor, you can:
1. insert new segments and delete existing segments,
2. edit the class name, ID or value of existing segments,
3. change the position of intermediate coordinates within a segment,
4. insert new nodes with segments (split) or merge two segment with the same code into a new segment,
5. check segments and polygonize segments.

Additionally, you can copy and paste segments to and from the clipboard, and pack segments.

You can create and edit a segment map in the segment editor using the mouse pointer on the screen, but you can also use the digitizer cursor when an analog paper map is stuck on your digitizer tablet. When you want to use the digitizer for the first time, you may have to setup the digitizer but you **must** reference the map to establish a relation between received digitizer coordinates and the XY-coordinates on your map. For more information, see also How to setup a digitizer, reference a map and start digitizing.

Further, in any map editor you can always use existing maps as a background by adding these maps as other data layers to the window (see How to digitize or How to add extra data layers to a map window).

When you want to create polygons later on, you have to make sure that all segments are properly connected to each other by nodes. This means you have to use snap and split and the beginnings and ends of all segments that are supposed to be connected with each other.

To start the segment editor
The segment editor is automatically started when you create a new segment map.

To edit an existing segment map, display the segment map in a map window, open the Edit menu, choose Edit Layer, and select the segment layer from the cascading menu. For more information, see How to edit point, segment, polygon, and raster maps. Dependent segment maps cannot be edited: first break the dependency links in the Properties dialog box of the map.

When the segment editor is started, a backup of the original segment map is automatically made; the backup has almost the same name as the original segment map, only the first character is replaced by a hash (#).

The Segment editor starts in Select mode: the mouse pointer appears as a hand. When digitizer is active, the Add Segments digitizer menu also appears.

Working with the digitizer

Make sure that the digitizer is properly set up, that the paper map is properly referenced on the digitizer tablet, and that the Digitizer command on the Options menu in the Main window is √Active.

When in the digitizer description below, it is written that you have to press a button, you have to press that button on your digitizer cursor which corresponds to the number that appears in front of the mentioned option on the digitizer menu. To press for instance the Move Points button, press that button on your digitizer cursor which corresponds to number 3:
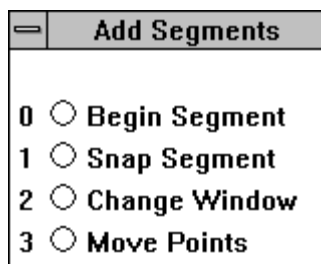
For more information on digitizer menus, see Appendices : Flow chart of digitizer menus.

To zoom in on the map

When digitizing it is very important that you zoom in on the part on which you are currently working to ensure proper snapping and splitting. You can zoom in with the digitizer cursor, but you can also click the Zoom in button in the button bar with the mouse pointer.

To zoom in with the digitizer buttons:
- press the Change Window button, and move the cursor to the first corner of the area on which you want to zoom in;
- press the 1st Point button, you now see the zoom in box tied to the first point, then move the cursor to the 2nd position of the area you want to zoom in;
- press the 2nd Point button.

To display the entire map again:
- press the Change Window button;
- press the Entire Map button.

Adding segments

To start segments:
1. To start a segment with a loose end:
   - position the cursor at the location where you to start a new segment.
   - press the Begin Segment button, and move the cursor in the direction of the segment you want to digitize.
   - press the Enter Point button. You can either press this button each time you want to insert another intermediate point or keep this button down to automatically add intermediate points while moving the cursor along the segment.
2. To start a segment from an existing node on an existing segment (*snap*):
   - Position the cursor at the node;
   - Press the Snap Segment button: the selected node changes its color;
   - When you want to snap to another node than the one that is currently selected, press the Snap Other button until the correct node is selected. If necessary, first move the cursor closer to the desired node.
   - Press the Accept button: your new segment is snapped to the existing node.
3. To start a segment from any other position on an existing segment (*snap/split*):
   - Position the cursor at the desired location in the segment;
   - Press the Snap Segment button;
   - Press the Snap Split button;
   - When you want to split the existing segment at another location, press the Return button and repeat the previous steps until the correct location is selected.
   - Press the Accept button: the existing segment is split at the selected location and your segment is snapped to the newly created node.

To delete intermediate points while inserting a segment:
- press the Delete Last Point button to remove the last point; continue to do so to remove one intermediate point at a time, or
- press and hold down the Delete Last Point button and move the cursor to delete multiple previously entered point(s).

To end segments
1. To end a segment with a loose end:
    ▪ position the cursor at the last point of the segment.
    ▪ press the End Segment button.
2. To end a segment on an existing node on an existing segment (*snap*):
    ▪ Position the cursor at the node;
    ▪ Press the Snap End Segment button;
    ▪ When you want to snap to another node than the one that is currently selected, press the Snap Other button, until the correct node is selected. If necessary, first move the cursor closer to the desired node.
    ▪ Press the Accept button: your segment is snapped to the existing node.
3. To end at any other position on an existing segment (*snap/split*):
    ▪ Position the cursor at the desired location in the segment;
    ▪ Press the Snap End Segment button;
    ▪ Press the Snap Split button to split the segment: the selected point is shown as a red box;
    ▪ When you want to split at another location in the same or another segment, move to that location and press the Snap Split button, until the correct location is selected.
    ▪ Press the Accept button: the existing segment is split at the selected location and your segment is snapped to the newly created node.
    ▪ When you decide not to snap, press the No Snapping button to return without changes.

To assign a class name, ID or value to the new segment:
Each time you end a segment, a **text box** will open asking for the class name, ID, or value of the segment. Whether you can enter a class name, ID, or value depends on the domain of the map.
▪ Enter a class, ID or value.
▪ Click OK or press Enter on the keyboard.

In case the map uses a class or value domain, the class name or value you just entered will be the default for the next segments that you digitize.

To move a node or an intermediate point
▪ Press the Move Points button and position the cursor at the point you want to move;
▪ Press the Take Points button to pick up the point;
When you want to move another point than the one that is currently selected, press the Take Points button until the correct point is selected. If necessary, first move the cursor closer to the desired point.
▪ Move the cursor to the new location of the point;
▪ Press the New Position button to drop the point on it's new position.

For more information on digitizer menus, refer to Appendices : Flow charts of digitizer menus.

Working with the mouse

To zoom in on the map
You can zoom in on the segment map by for instance clicking the Zoom In button in the button bar. For more information, see Map window : zoom in.

To switch between Select mode, Move Points mode, and Insert mode
- select another mode from the Edit menu, or
- click one of the mode buttons in the button bar.

You can also press the Esc or the Ins key on the keyboard, see Appendices : keyboard shortcuts.

Select mode to select existing segments
In the Select mode, the mouse pointer appears as a hand. You can select one or more segments by clicking them, in order to change their class name, ID, or value.
- to select a segment: click it.
- when you double-click a segment, you can immediately change the class name, ID, or value of the segment.
- to add segments to a selection: press and hold down the Ctrl key and click the other segments you want to select. When finished, release the Ctrl key.
- to clear a part of a selection: press and hold down the Ctrl+Shift keys, then click previously selected segments: these segments are deselected. When finished, release the Ctrl+Shift keys.
- to toggle between select and deselect: press and hold down the Shift key, then click segments: selected segments are deselected, and non-selected segments are selected. When finished, release the Shift key.

To change the code of selected segments
Depending on the domain of the segment map that you are editing, you can change the class name, identifier or value of selected segments:
- double-click a segment and select a class name or type an identifier of a value, or
- select one or more segments, and select Edit from the Edit menu or from the context-sensitive menu, or press the Enter key on the keyboard. In the Edit dialog box that appears, select a class name, or type an identifer or value. Segments in a segment map that uses an identifier domain can only be edited individually.

When you enter an identifier that is not yet present in the domain that the map is using, this identifier is automatically added to the domain. To enter a new class name, select <**new**> from the list, this class name is automatically added to the domain. In maps using a value domain, you cannot enter values that do not fit the value range of that domain. For more information, see Segment editor : Edit selection.

To delete selected segments
First make a selection and then press the Del key on the keyboard, or choose Delete from the Edit menu or from the context-sensitive menu.

To cut, copy and paste

To copy segments to the clipboard, make a selection and choose Copy from the Edit menu. Segment coordinates and segment class names, identifiers or values are copied. To paste data from the clipboard, choose Paste from the Edit menu. For more information, see Segment editor : Copy and Segment editor : Paste. When you select Cut from the Edit menu, the selection is copied to the clipboard and then deleted from the map.

Insert mode to add segments to the segment map

In Insert mode, the mouse pointer appears as a pencil. In Insert Mode you can use Autosnap (default). When Autosnap is active, the system automatically snaps to nodes and splits when necessary, i.e. there is less need to use the Shift or the Ctrl key as described below. You can specify a snap tolerance in pixels in the Customize Segment editor dialog box.

To insert a new segment
- position the mouse pointer on the location where you want to start a new segment;
- press the left mouse button to start the segment (begin node);
- hold the left mouse button down and move the mouse to automatically insert segment coordinates (stream mode), or
- click at the positions at which you want to insert intermediate points;
- double-click or press the space bar to end the segment with a loose end (end node).

To delete intermediate points while inserting a segment
- press the right mouse button once to delete the last point, or
- keep the right mouse button down and move the mouse to delete multiple points, or
- press Esc to delete all points, i.e. the complete segment.

To connect a new segment to an existing node (*snap*)
- position the mouse pointer on the node to which you want to snap;
- when AutoSnap is inactive, press and hold down the Shift key and click the node;
- when AutoSnap is active, you can simply click the node.

To start or end a new segment on an existing segment (*snap/split*)
- position the mouse pointer somewhere on a segment;
- when the AutoSnap is inactive, press and hold down the Ctrl key and click the segment, or
- when the AutoSnap is active, click with the mouse pointer on the segment;
- a message box asks for confirmation to split the segment;
- when you answer Yes, the new segment is snapped to the new node.

Move Points mode to change the position of a coordinate in a segment
In the Move Points mode, the mouse pointer appears as a pair of tweezers. Further, all segment nodes appear as boxes and all intermediate coordinate pairs appear as crosses. In the Move Points mode, you can drag individual coordinates within a segment to a new position.

There are three ways *to move* a node or an intermediate point:
1. Click a begin or end node or an intermediate point;
   The selected point and its segment change their color;
   Move the point to another postion;
   Click again to drop the point.
2. Press and hold down the left mouse button on a node or an intermediate point,
   The selected point and its segment change their color;
   Move the point to another postion;
   Release the left mouse button to drop the point.
3. To pick up a node to which multiple segments are connected: click the node, the node is selected and one segment changes its color;
   If this is not the segment you want, do not move the mouse and click again, until the the correct segment is selected;
   Then, move the node to another postion.
   Click again to drop the point.

To *snap* the selected point to an existing node:
- position the selected point on the node to which you want to snap;
- when the AutoSnap is inactive, press and hold down the Shift key and click or release the left mouse button on the node;
- when AutoSnap is active, you can simply click or release the left mouse button on the node.

To *split* a segment and snap to the selected point to the created node (*snap/split*):
- position the selected point somewhere on a segment;
- press and hold down the Ctrl key and click somewhere on the segment;
- a message box asks for confirmation to split the segment to which you want to snap to.

Split/Merge mode to split and merge segments
In the Split/Merge mode, the mouse pointer appears as a pair of scissors.

To split a segment:
- Position the mouse pointer at the location where you want to split a segment;
- Click the left mouse button;
- A message box asks for confirmation to split the segment.

To merge two segments:
To remove a superfluous node which connects only two segments which have the same code:
- Position the mouse pointer at the node;
- Click the left mouse button.
- A message box asks for confirmation to merge the segments.

Other options

To customize the segment editor
When you choose Customize from the Edit menu or from the context-sensitive menu, you can among others indicate whether to use Autosnap or not and choose the colors in which you want to see your segments. For more information, see Segment editor : Customize.

To pack segments
You can permanently remove segments from a segment map, when you have marked some segments for deletion. See Segment editor : Pack segments.

To check segments
With Check Segments you can check whether segments were correctly digitized. You can perform a check on self overlap, dead ends, intersections and on code consistency.

To polygonize segments
To polygonize, choose Polygonize from the File menu. During polygonization topology is created. You can polygonize the entire segment map or a selection of segments in the current segment map. You can create different polygon maps from one segment map, by using a mask. When during polygonization you create a dependent polygon map, this map can be updated (after you have made further changes in the segment map), by clicking the Make Up-to-Date button in the Properties dialog box of the polygon map.

When you polygonize, a check on Self Overlap, Intersections and Dead Ends is automatically performed before the map is polygonized. If there are errors in the segments, the operation is aborted and the errors must first be corrected. After correction the operation can be restarted. It is therefore advised to check segments before polygonization; in case errors are found, you have to correct these.

To exit the segment editor
To exit the segment editor, choose the Exit Editor command on the File menu or from the context-sensitive menu or click the Exit Editor button in the button bar. When you double-click the Control-menu box the Window closes. All changes that you make in the segment map during this session are continuously stored.

For more information, see also Appendices : Keyboard shortcuts and Appendices : Mouse functions.

5.4.2 Segment editor Menu commands

File	Undo All Changes	
	Pack	
	Check Segments	Self Overlap...
		Dead Ends...
		Intersections...
		Code Consistency...
	Polygonize	
	Customize	
	Exit Editor	
Edit	Cut	
	Copy	
	Paste	
	Delete	
	Edit ...	
	Insert Code ...	
	√ Select Mode	
	Move Points	
	Insert Mode	
	Split/Merge Mode	
	Undelete Segments	
Layers	*see Pixel editor*	
Options	*see Pixel editor*	
Help	*see Pixel editor*	

Context-sensitive menu

Select Area
Edit ...
Insert Code ...
Delete
Undelete Segments
Customize
Exit Editor

5.4.3 Segment editor Button bar

The button bar of the Segment editor has the same buttons as a normal map window and some extra buttons for the different modes in the Segment editor and a button to exit the editor.

The following actions can be performed:

Entire Map: Displays the entire map in the map window.

Zoom In: Zooms in on a selected spot or area in the map. The mouse pointer changes into a magnifying-glass. Click to zoom in on a spot of interest, or drag the pointer from one corner of interest to another (the mouse pointer changes into a little box).

Zoom Out: Zooms out directly from the center of the displayed map with a factor 2.

Larger: Enlarges the size of the window with a factor 2. If this would not fit on your screen, this button is empty.

Smaller: Reduces the size of the window with a factor 2.

Redraw: Redraws the contents of the map window.

Select mode: Allows you to select one or more existing segments to be edited. When in Select mode the mouse pointer appears as a little hand. Select a single segment by clicking it; select multiple segments by holding the Ctrl key on the keyboard; or select all segments within a rectangular area by dragging a box around the segments of interest.

Move Point mode: allows you to select a point within a segment and drag it to its new position. When in Move point mode, the mouse pointer appears as a little pair of tweezers.

Insert mode: allows you to insert new segments. When in Insert mode, the mouse pointer appears as a little pen.

Split/Merge mode: Allows you to split a segment (insert a node within a segment), or to merge segments (delete a node between two segments with the same class name, ID or value). When in Split/Merge mode, the mouse pointer appears as a pair of scissors.

Exit editor: Leaves the editor and keeps all changes.

The button bar can be hidden or shown with the Button Bar command on the Options menu. If the action of a certain button cannot be performed at a certain moment, the button appears gray.

5.5 Point editor

5.5.1 Functionality

The point editor is used to edit a point map.

In the point editor you can work with the mouse and the digitizer apart or simultaneously.

The point editor has a Select mode, Move Points mode, Insert mode and Split/Merge mode. The point editor has a menu bar, a context-sensitive menu, and a button bar.

With the point editor, you can:

1. insert new points,
2. move points to another position,
3. delete points
4. edit the code of existing points

Additionally, you can copy points and paste points or pixels to and from the clipboard.

You can create and edit a point map in the point editor using the mouse pointer on the screen but you can also use the digitizer cursor when a map is stuck on your digitizer tablet. When you want to use the digitizer for the first time, you may have to setup the digitizer or reference the map. For more information, see How to setup a digitizer and How to reference a map.

When the digitizer is active, the Point Editor menu. If not, reference your map again. Depending on the digitizer set up, the numbers noted in front of a command in the different digitizer modes, correspond with a digitizer cursor button (see How to set up a digitizer). To activate the command, press the button. For a flowchart of the diferent digitizer menus, see Appendix : Flow charts of digitizer menus.

Further, in any map editor you can always use existing maps as a background by adding these maps as other data layers to the window (see How to add extra data layers to a map window).
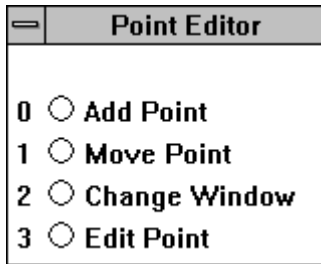
To start the point editor
The point editor is automatically started, when you are creating a new point map.

To edit an existing point map, display the point map in a map window, open the Edit menu, choose Edit Layer and select the point layer from the cascading menu. You can also open the context sensitive menu in the Catalog and select Edit. For more information, see How to edit point, segment, polygon, and raster maps. Dependent point maps can not be edited: first break the dependency links in the Properties dialog box of the map.

When the editor is started, the mouse pointer appears as a little hand (Select mode). When the digitizer is active the Edit Point menu also appears.

Working with the digitizer

When in the following part is written that you have to press e.g. the Edit Point button, this means that you have to press the cursor button of your digitizer cursor, which corresponds with the number in front of the Edit Point option in the digitizer mode window. In the example, this is the cursor button corresponding with 3:

```
┌──────────────────────────────┐
│ ─│   Point Editor            │
├──────────────────────────────┤
│                              │
│  0  ○  Add Point             │
│  1  ○  Move Point            │
│  2  ○  Change Window         │
│  3  ○  Edit Point            │
│                              │
└──────────────────────────────┘
```

For the readability of this part, this is kept short.

To add a point
Move the cursor to the position where you want to add a point. Press the Add point button. When you add the first point, a text box will open. Enter the class, ID or value corresponding with the point you want to add (depending on the Domain of the point map that you are editing). In case of class or value, these will be default for the next digitized points. Press Enter on the keyboard to add, click cancel in the box or press Esc on the keyboard to return without adding.

To move a point
Move the digitizer cursor to the point you want to move and press the Move Point button. Move the cursor to the position you want to move the point to. Press the New position button to put the point on the desired position or press the Return button to cancel.

To edit a point
Move the cursor to the point you want to edit. Press the Edit Point button to open a text box. Enter the new class, ID or value (depending on the Domain of the point map that you are editing). Press Enter on the keyboard to edit the point, or Esc to return without changing anything.

To change the window
Press the Change Window button. Move the cursor to the first corner of the area you want to zoom in. Press the 1st Point button, you now see the zoom in box tied to the first point. Move the cursor to the 2nd position of the area you want to zoom in. Press the 2nd Point button, to zoom in the area. To display the entire map after a zoom in command, press the Entire Map button.
See also Appendix : Digitizer Modes.

Working with the mouse

To zoom in on the map
You can zoom in on the point map for instance clicking the Zoom In button on the button bar. For more information see Map window : zoom in.

To switch between Select mode, Move Points mode and Insert mode
▪ select another mode from the Edit menu, or

- click one of the mode buttons in the button bar.

You can also press the Esc or the Ins key, see Appendices : keyboard shortcuts.

Select mode to select existing points
In Select mode, the mouse pointer appears as a little hand. You can select one or more points by clicking them, in order to change their class name, ID, or value.
- to select a single point, click it,
- when you double-click a single point, you can immediately change the class name, ID, or value of the point.
- to select all points within an area: drag a box with the left mouse button and all points within the box are selected.
- to add points to a selection: press and hold down the Ctrl key and click the other points you want to select. When finished, release the Ctrl key.
- to clear a part of a selection: press and hold down the Ctrl+Shift keys, then click previously selected points or drag a box around points: these points are deselected. When finished, release the Ctrl+Shift keys.
- to toggle between select and deselect: press and hold down the Shift key, then click points or drag a box around points: selected points are deselected, and non-selected points are selected. When finished, release the Shift key.

To change the class name, ID or value of selected points
Depending on the domain of the point map that you are editing, you can change the class name, identifier or value of selected points:
- double-click a single point, or
- select one or more points and press Enter, or
- select one or more points, and select Edit from the Edit menu or from the context-sensitive menu.
In the dialog box that appears, select a class name, or type an identifier or a value. Points in a point map that uses an identifier domain can only be edited individually.

When you enter an identifier that is not yet present in the domain that the map is using, the identifier is automatically added to the domain. When you want to enter a class name, a list of the classes which are already in the domain appears in a text box. You can select an existing class, a ? mark if the point is undefined or **<new>** to create a new class which will be automatically added to the domain. In maps using a value domain, you are not allowed to enter values that do not fit in the value range of that domain. If you do so, the points will be given the value undefined. For more information, see Point editor : Edit selection.

To delete existing points
first make a selection and then press the Delete key, or choose the Delete option from the Edit menu or from the context-sensitive menu.

Copy points to the clipboard
Copies selected points with coordinates and class names, identifiers or values to the clipboard (see: point editor : edit menu : copy).

Paste from the clipboard
Pastes data from the clipboard to the map (see: point editor : edit menu : paste)

Move Points mode to move points to a new position
In Move Points mode, the mouse pointer appears as a pair of tweezers. Take a point and drag it to a new position.

Insert mode to insert new points
In Insert mode, the mouse pointer appears as a little pencil.
Click on the position in the window where you want to insert a new point,
select a class name for this point or type an identifier or a value or for this new point.

You can also insert a new point by typing its coordinates on the keyboard: select Add Point from the Edit menu or from the context-sensitive menu.

Other Options

To customize the point editor
When you choose Customize from the File menu or from the context-sensitive menu, you can among others indicate whether to show text next to your points and choose the symbol type and color in which your points should be displayed. For more information, see Point editor : Customize.

To exit the point editor
To exit the point editor, choose the Exit Editor option on the File menu or from the context-sensitive menu or click the Exit Editor button in the button bar. When you double-click the Control-menu box the Window closes. All changes that you made in the point map during this session are continuously stored.
For more information, see also Appendices : Keyboard shortcuts and Appendices : Mouse functions.

5.5.2 Point editor Menu commands

File	Customize
	Exit Editor
Edit	Cut
	Copy
	Paste
	Delete
	Edit ...
	Add Point ...
	√ Select Mode
	Move Points
	Insert Mode
Layers	*see Pixel editor*
Options	*see Pixel editor*
Help	*see Pixel editor*

Context-sensitive menu

Select Area
Edit ...
Delete
Add Point ...
Customize
Exit Editor

5.5.3 Point editor Button bar

The button bar of the Point editor has the same buttons as a normal map window and some extra buttons for the different modes in the Point editor and a button to exit the editor.

The following actions can be performed:

Entire Map: Displays the entire map in the map window.

Zoom In: Zooms in on a selected spot or area in the map. The mouse pointer changes into a magnifying-glass. Click to zoom in on a spot of interest, or drag the pointer from one corner of interest to another (the mouse pointer changes into a little box).

Zoom Out: Zooms out directly from the center of the displayed map with a factor 2.

Larger: Enlarges the size of the window with a factor 2. If this would not fit on your screen, this button is empty.

Smaller: Reduces the size of the window with a factor 2.

Redraw: Redraws the contents of the map window.

Select Mode: Allows you to select one or more existing points to be edited. When in Select Mode, the mouse pointer appears as a little hand. Select a single point by clicking it; select multiple points by holding the Ctrl key on the keyboard; or select all points within a rectangular area by dragging a box around the points of interest.

Move Point mode: allows you to move a point to another position. Select a point and drag it to its new position. When in Move point mode, the mouse pointer appears as a little pair of tweezers.

Insert Mode: allows you to insert new points with the mouse. When in Insert mode, the mouse pointer appears as a little pen.

Exit editor: Leaves the editor and keeps all changes.

The button bar can be hidden or shown with the Button Bar command on the Options menu. If the action of a certain button cannot be performed at a certain moment, the button appears gray.

5.6 Domain Class/ID editor

5.6.1 Functionality

In the domain Class/ID editor you can change the class names of a domain class map or the IDs of a domain ID map.

A class domain contains all class names used in a map, such as the names of your soil units or the names of your land use classes, etc. An ID domain contains all IDs for the elements in your map.
The same domain can be used for several maps.

Class names or IDs can have any length you like. You can set the width of a domain Class or ID through the properties of the domain (see also How to view and edit the properties of an object). By default, the width for a class domain is 15, and for an ID domain 6 characters. Class names and IDs may contain any character you like (capitals, small letters, spaces, underscores, etc.). However, especially if you want to use ILWIS in combination with other packages, it is wise to limit the use of dots ., stars *, and spaces; underscores will generally not give rise to problems.

The domain Class/ID editor consists of:
- a window in which all the class names or IDs appear and
- a menu.

To add new class names
- open the Edit menu, select the command Add Item, and
- type a new class name, or
- press the Ins key on your keyboard and enter a new class name.

To edit a class name
- select a class name in the domain editor window,
- open the Edit menu, select the command Edit Item, and
- edit the class name, or
- double-click a class name in the domain editor window and edit it.

To delete a class name
- select a class name in the domain editor window,
- open the Edit menu, select the command Delete Item, or
- select an item in the domain editor window and press the Del key on your keyboard.

To sort class names
Class names can be sorted alphabetically and manually. If you select a class name, you can drag it to a new position in the list. To sort alphabetically, open the Edit menu and select the command Alphabetic Sorting.

Through the domain Class/ID editor, you can also change the representation of classes. Open the Edit menu and select the Edit Rrepresentation command.

To merge domains

To merge the classes or IDs of another domain into the current domain, open the Edit menu and select the Merge Domain command.

5.6.2 Domain Class/ID editor Menu commands

File	Exit
Edit	Copy
	Add Item ...
	Edit Item ...
	Delete Item
	Merge domain...
	Properties
	Representation
	√ Alphabetical Sorting
	Manual Sorting
Options	Status Line
Help	*see Pixel editor*

5.7 Representation Class editor

5.7.1 Functionality

With the representation Class editor, you can change the representation of a class domain, a group domain, or a picture domain. In the representation Class editor, you see all the class names of this domain, and the colors assigned to these classes. Also, you can see the patterns assigned to polygons, line widths assigned to segments and symbols assigned to points.

The Representation Class editor consists of a central part with the class names and their colors, a menu bar, a button bar, and Red, Green and Blue color scroll bars at the bottom of the window.

To start the Representation Class editor, see Help topics How to create a new representation and How to edit a representation.

General working of the Representation Class editor
1. Select a map type:
    - click one of the buttons in the button bar: raster, polygon, segment,
    - or point, or
    - open the Options menu and select Raster, Polygon, Segment or Point.

    Keep in mind that when changing a color of a class in one 'mode' (e.g. Polygon), then the color of this class is also changed in all other modes (e.g. Raster, Segment).

2. Select a class and edits its color, etc.:
   - double-click a class or its color box, or
   - select a class or its color box and choose Edit Item from the Edit menu, or
   - select a class or its color box and press Enter on the keyboard.

   The Edit Repr Item dialog box appears.

   In the Edit Repr Item dialog box, you can edit:
   - select or create a color (raster form);
   - select or create a color and select a pattern (polygon form);
   - colors and line widths (segment form);
   - symbol types, symbol sizes, pen widths, colors and fill colors (point form).

   To edit only the colors of a selected class, you can use the Red, Green and Blue color scroll bars at the bottom of the window.

To interactively change colors of maps

1. For maps with a class or group domain:
   - Display the map in a map window; open the Layers menu, choose the Double-Click Action command, and select the Edit Representation option;
   - Then, double-click the units in the map: each time a Edit Repr Item dialog boxes appears in which you can directly change colors, patterns, etc.;
   - Redraw the map window to apply the changes;
   - Continue editing colors and redrawing the map until satisfied.

   For more information, see Map window : advanced functionality.

2. For maps with a class, group or value domain:
   - Display a map with a class, group or value domain in a map window; open the map's representation by selecting the Representation command on the Edit menu in the map window;
   - One of the representation editors appears, edit one or more colors;
   - Keep the editor open and switch to the map window;
   - Redraw the map window to apply the changes;
   - Continue editing colors and redrawing the map until satisfied.

5.7.2 Representation Class editor Menu commands

File	Exit
Edit	Edit item (Raster) Edit item (Polygon) Edit item (Segment) Edit item (Point) Properties
Options	Raster Polygon Segment Point Column Width... Button Bar Status Line
Help	*see Pixel editor*

5.7.3 Representation Class editor Button bar

The buttons in the button bar of the Representation Class editor allow you to select a map type. This shows the representation as if this representation was used by that map type.

Every class name has one color. Each pixel, polygon, segment, point with that class name uses that color. Further, polygons, segments, and points have some other representation characteristics.
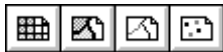
The following actions can be performed:

Raster Map: Edit the colors of this representation as used to display a raster map.

Polygon Map: Edit the colors and patterns of this representation as used to display a polygon map.

Segment Map: Edit the colors and line widths of this representation as used to display a segment map.

Point Map: Edit the colors and symbols of this representation as used to display a point map.

The button bar can be hidden or shown with the Button Bar command on the Options menu.

5.8 Representation Value/Gradual editor

5.8.1 Functionality

The Representation Value/Gradual editor allows you to change the representation of a map that uses a value domain. In the Representation Value/Gradual editor, the values of the domain that uses this representation are called boundary values or limits. The general idea is that you insert limits, assign colors to limits and that you choose a coloring method for the values in between two limits.

To start the Representation Value/Gradual editor, see Help topics How to create a new representation and How to edit a representation.

Parts of the Representation Value/Gradual editor
- The Representation Value/Gradual editor has a menu bar.
- In the editor, you see values or percentages on the left, and colors on the right side of the window.
  - Percentages are shown when you create a new representation for a map using the system domain Value, or when you edit an existing representation gradual;
  - Values are shown when you create a new representation for a map with any value domain, except the system domain Value, or when you edit an existing representation value.

  These values or percentages in the representation Value/Gradual editor are called boundaries or limits.
- At the bottom, you see a color bar which gives an overview of how all colors are assigned to the values of the domain.

General working of the Representation Value/Gradual editor
In general, in the representation Value/Gradual editor, you can:
- insert and delete limits,
- change the color assigned to limits,
- change the value of limits,
- change the coloring method of values in between two limits.

To change the color or the value of a limit
- double-click a limit, or
- select a limit and press Enter on the keyboard, or
- select a limit and, from the Edit Menu, choose Edit Limit.
In the appearing Edit Limit dialog box, you can select new color for this limit. You can also change the value or percentage of the limit.

To insert a limit
- press Ins on the keyboard, or
- from the Edit Menu, choose Insert Limit.
In the appearing Insert Limit dialog box, you can fill in a new value (percentage or value) for the limit, and you can select a color for this limit.

To delete a limit
- select a limit and press Del on the keyboard, or
- select a limit and, from the Edit Menu, choose Delete Limit.

To choose a coloring method for values/percentages in between two limits
For values or percentages in between two limits there are three possibilities:
1. colors either range from the color of the limit below to the color of the limit above (**stretch**), or
2. they have the same color as the limit below (**lower**) or
3. they have the same colors as the limit above (**upper**).

To change the coloring of value/percentages in between two limits:
- double-click in between two limits, or
- select a limit or color and press Enter on the keyboard, or
- select a line in between limits and, from the Edit Menu, choose Edit Limit.

So, when starting from stretch, one double-click results in a change to the color of the upper limit, another double-click results in the color of the lower limit, and yet another double-click results in stretch again.

To change the number of colors in between two limits
- From the Edit menu, choose Stretch Steps.
  In the appearing Stretch Steps dialog box, enter a value for the number of colors that should be used in between two limits.

To interactively change colors of value maps
- Open a map with a value domain in a map window, open the map's representation by selecting the Representation command on the Edit menu of the map window;
- The Representation Value/Gradual editor is opened; insert limits, edit colors, etc.;
- Keep the editor open and switch to the map window;
- Redraw the map window to apply the changes;
- Continue editing colors and redrawing the map until satisfied.

5.8.2 Representation Value/Gradual editor Menu commands

File	Exit
Edit	Insert Limit ...
	Edit Limit ...
	Delete Limit
	Stretch steps...
	Properties
Options	√ Status Line
Help	*see Pixel editor*

5.9 Georeference Tiepoints editor

5.9.1 Functionality

With the tiepoint editor you can create a georeference tiepoints. A georeference tiepoints stores the relation between user-indicated points in a raster map or image (row,col) and coordinates (X,Y). These user-indicated points are called tiepoints or control points.

The tiepoint editor displays a raster map and existing tiepoints in a map window. Further, the Row, Column values, and X and Y coordinates of existing tiepoints are displayed in a table in a secondary window. The tiepoint editor has a menu bar, a button bar, a status line and a context-sensitive menu.

Purpose of a georeference tiepoints
A georeference tiepoints is mostly used to add coordinates to a satellite image or another map which is not North-oriented and/or in which the pixels do not represent exactly square areas on the ground. One georeference tiepoints should be used for all bands of an image.

When you added tiepoints to an image, you can:
- display any type of vector data on top of the map;
- create or update vector data using the georeferenced image as background (on-screen interpretation);
- use the map in pixel info;
- when you have raster maps of different sources or images of different dates and you want to perform raster operations to combine these maps or images (e.g. MapCalc, Cross), first create a georeference tiepoints for each set of maps/images, then use the Resample operation and resample the maps/images preferably to a georeference corners;
- when you want to combine rasterized vector maps with satellite data, you can rasterize the vector data on the georeference tiepoints of the satellite images. In case you prefer North-oriented raster maps, rasterize the vector maps with a georeference corners, and Resample the images with the georeference tiepoints to this georeference corners.

Inserting tiepoints
In the tiepoint editor, tiepoints can be added to a map in several manners:
- first, click at a recognisable point in the map without coordinates,
- the Add Tie Point dialog box appears. In this dialog box, the row and column values at the position of the click are filled out.
When you already have some tiepoints, the dialog box will also come up with a suggestion for the XY-coordinates. This suggestion is the result of the calculation with the existing tiepoints and using the current transformation method. This suggestion is a measure of the quality of the current tiepoints. The suggestion is merely a suggestion, it is advised to enter your own XY-coordinates to prevent false accuracy.

Then:
- click at the same position in a map which already has correct XY-coordinates and which is displayed in another map window (master/slave), or
- digitize the same point in an analog paper map which is stuck on a digitizer, or
- read the correct XY-coordinates for this point from a table or an analog paper map, and type these XY-coordinates in the dialog box.

(De)selecting tiepoints
Column `Active` in the tiepoint table indicates whether or not a tiepoint is used in the transformation. Include tiepoints by the putting True in column `Active`; exclude tiepoints by putting False in column `Active`. You can type T or F in column `Active` or use the space bar to switch between these.

Selecting a transformation method
In the tiepoint editor, one of the following transformation methods can be selected: conformal, affine, second order bilinear, full second order, third order and projective. Information is displayed on the deviation (in pixels) of each tiepoint to calculated values, also sigma is displayed. Usually, for satellite images an affine transformation will do, and for oblique photographs a projective transformation can be selected.

Inspecting DRow, DCol and Sigma
Columns DRow and DColumn show the difference between calculated Row and Col values and actual Row and Col values in pixels. Very good control points have DRow and DCol values less than 2. Sigma is calculated from these values and the degrees of freedom, and gives a measure for the overall accountability or credibility of the active tiepoints.

☞ When you have already a vector map of the area of the image, it can be handy to display this vector map on top of the image while working with the tiepoint editor.

☞ When you now add tiepoints to the image and press the Redraw button ![icon], you can judge the quality of the tiepoints.

5.9.2 Georeference Tiepoints editor Menu commands

File	Exit Editor
Edit	Copy
	Paste
	Delete
	Add Tie Point ...
	Delete Tie Point...
	Transformation
	Customize
Layers	*see Pixel editor*
Options	*see Pixel editor*
Help	*see Pixel editor*

Context-sensitive menu

Select Area
Add Tie Point ...
Delete Tie Point...
Transformation
Customize
Exit Editor

5.9.3 Georeference Tiepoints editor Button bar

The button bar of the georeference tiepoints editor largely resembles the button bar of a map window but there are some extra buttons to add a tiepoint, to delete a tiepoint, to choose a transformation method and to exit the editor.

The following actions can be performed:

Entire Map: Displays the entire map in the map window.

Zoom In: Zooms in on a selected spot or area in the map. The mouse pointer changes into a magnifying-glass. Click to zoom in on a spot of interest, or drag the pointer from one corner of interest to another (the mouse pointer changes into a little box).

Zoom Out: Zooms out directly from the center of the displayed map with a factor 2.

Larger: Enlarges the size of the window with a factor 2. If this would not fit on your screen, this button is empty.

Smaller: Reduces the size of the window with a factor 2.

Redraw: Redraws the contents of the map window.

Add tiepoint: Opens the Add Tiepoint dialog box in which you can enter Row and Column numbers and XY-coordinates for a new tiepoint from the keyboard. You can also add tiepoints by clicking in the map window, or by typing the Row and Column numbers and XY-coordinates directly in the tiepoint table.

Delete tiepoint: Opens the Delete Tiepoint dialog box in which you can specify the the number of the tiepoint you want to delete. You can also delete one or more tiepoints by selecting records in the tiepoint table, then press the Del key on the keyboard or choose Delete from the Edit menu.

Transformation method: Opens the Transformation dialog box in which you can select a transformation method with which the relation between Row and Column values and the XY-coordinates of your tiepoints should be calculated.

Exit editor: Leaves the editor and keeps all changes.

The button bar can be hidden or shown with the Button Bar command on the Options menu. If the action of a certain button cannot be performed at a certain moment, the button appears gray.

5.10 Georeference 3D editor

5.10.1 Functionality

With the georeference 3D editor, you can edit a georeference 3D and obtain a 3D view of your study area according to your wishes. The georeference 3D editor consists in fact of one dialog box in which you can edit 3D view parameters. Further, the georeference 3D editor has a menu bar, a context-sensitive menu and a button bar.

To start the georeference 3D editor
To create a new georeference 3D, you need first of all an interpolated height map (Digital Elevation Model/Digital Terrain Model). For more information on obtaining a DEM, see How to calculate a DEM.
Select for instance the Create Georeference command on the File menu of the Main window. In the appearing dialog box, select the option button Georeference 3D and select the height map and specify the size of the map window in which your 3D view will be displayed. After the Display Options - 3D Grid dialog box, a map window is opened showing an initial 3D view. In the map window, select Georeference from the Edit menu to start the georeference 3D editor.

To edit an exisitng georeference 3D, you can double-click a georeference 3D in the Catalog. After the Display Options - 3D Grid dialog box, a map window is opened showing your 3D view. In the map window, select Georeference from the Edit menu to start the georeference 3D editor.

In the Display Options - 3D Grid dialog box, you can specify whether you want to see the 3D view as grid lines with or without a drape of a raster map.

For more information on creating a georeference 3D, refer to How to create a 3D view.

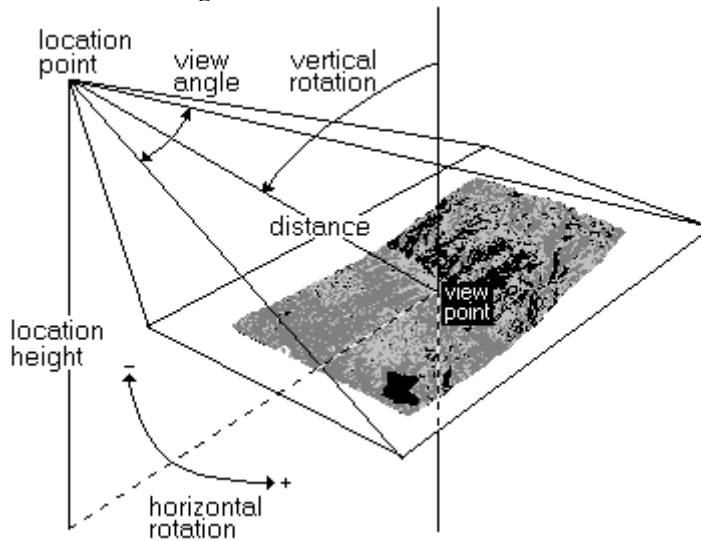**Parameters of a georeference 3D or a 3D view**

Figure 1: This picture shows you a simplified overview of how the relationship between the observer and the terrain is determined.

The options in the Georeference 3D dialog box are shortly described below.

View Angle:
The View Angle is an angle in degrees which defines the aperture of the observer's sight, i.e. how much you can see of your 3D model.
- When the view angle is small, only a small area of the total 3D view is observed, with the view point as the middle of the observed area.
- The larger the angle, the larger the area that is observed.
- A maximum of 180° is allowed.

Scale Height:
The Scale Height defines how much the altitude (Z) should be exaggerated compared to the XY-scale.
- A scale height of 1 means no height exaggeration.
- A scale height > 1 means that vertical exaggeration is increased.
Note that when you increase the scale height, more parts of your study may fall behind exaggerated parts and can thus no longer be seen.

View Point:
The View Point is the XY-location you want to look at. The Z-coordinate of this
point is defined by the DEM. The view point will be drawn in the center of the map
window.

Horizontal Rotation:
The Horizontal Rotation is an angle in degrees to rotate the 3D view anti-clock
wise from the south-north direction.

- When 0° is specified, the 3D view is orientated south-north. The observer is
  located to the south of the DEM.
- When 90° is specified, the 3D view is oriented west-east. The observer is
  located to the west of the DEM.
- When -90° is specified, the 3D view is oriented east-west. The observer is
  located to the east of the DEM.

Vertical Rotation:
The Vertical Rotation is an angle in degrees away from a vertical through the
terrain.

- When 0° is specified, the line of sight is perpendicular to the 3D view; the
  observer is located high in the sky and looks straight down on the 3D view.
- When 90° is specified, the line of sight is parallel to the 3D view; the oberver is
  located on the same height as the view point and sees the 3D view in front of
  him.

Distance:
The Distance is the distance between the observer and the view point.

- When a large distance is specified, you get a general overview of the observed
  3D view.
- To observe the 3D view in detail, you should decrease the distance.

Location Point:
The Location Point is the location of the observer in XY-coordinates.

Location Height:
The Location Height is the altitude of the observer.

All changed parameters are immediately stored in your georeference 3D. To see the
effect of changed view parameters, you need to redraw the map window: click the

Redraw button [□] in the button bar of the map window, or press Ctrl+R on the
keyboard.

Effects of changing 3D view parameters

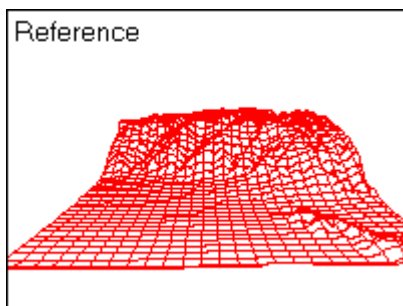The different view parameters are illustrated in the figures below.

Figure 2: Reference situation. The observer is standing almost in front of the DEM looking towards the north.

In the following four pictures, only one parameter is changed.
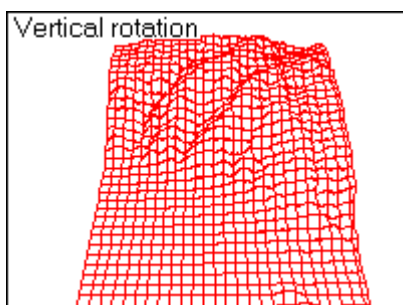In the last picture a number of parameters are changed.

Figure 3: The vertical rotation is decreased from 82° to 40°. The observer looks more upon the DEM.
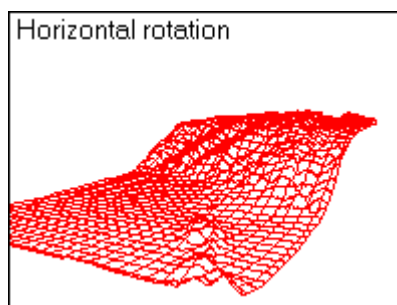

Figure 4: The horizontal rotation is changed from 0° to 30°. The observer is looking into the north-west.
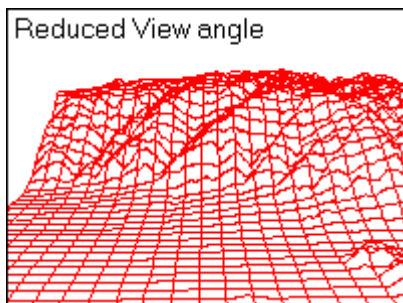

Figure 5: The view angle is decreased from 90° to 60°. The observed part of the DEM became smaller.
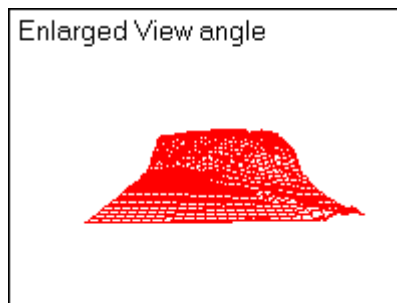

Figure 6: The view angle is increased to 120°. The observed part of the DEM became larger.
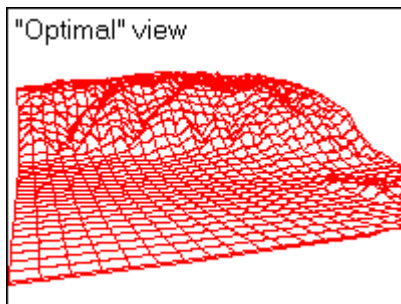
Figure 7: Several parameters are changed, including the view point. In this way, you can find an 'optimal' 3D view, depending on the purpose.

It is advised to adjust:
- the View Angle, until you see your whole study area in the map window,
- the Vertical and Horizontal Rotation, until you see your area from a favourable position,
- the View Point, until the 3D view is nicely positioned in the map window,
- the Scale Height, to exaggerate height differences,
- or other parameters as you wish.

☞ The 3D view parameters are not independent. When you change one parameter, some others may automatically change as well. When you edit the values of the view point, horizontal rotation, vertical rotation or distance, the values of the location point and/or location height of the observer automatically change, and vice versa.

To exit the georeference 3D editor
To close the georeference 3D editor and return to the map window, click the Exit editor button in the button bar, choose Exit from the File menu, or double-click the control-menu box of the dialog box. Your 3D view is displayed in the map window. The parameters last used in the editor are stored in the georeference 3D.

As the map window now uses this georeference 3D, you can also add other vector maps to improve the 3D view. Of course, you can also add annotation.

To save the 3D view
To save the 3D view in the map window, choose the Save View or the Save View As command from the File menu in the map window.
To permanently display a raster map with a georeference 3D, you can use the Apply 3D operation.

5.10.2 Georeference 3D editor Menu commands

File	Exit editor
Edit	Edit

Context-sensitive menu

Select Area
Redraw
Layer Management

5.10.3 Georeference 3D editor Button bar

The picture below shows the button bar of the Georeference 3D editor.

The following actions can be performed:

Entire Map: Displays the entire 3D view in the map window.

Zoom In: Zooms in on a selected spot or area in the 3D view. The mouse pointer changes into a magnifying-glass. Click to zoom in on a spot of interest, or drag the pointer from one corner of interest to another (the mouse pointer changes into a little box).

Zoom Out: Zooms out directly from the center of the displayed map with a factor 2.

Larger: Enlarges the size of the map window with a factor 2. If this would not fit on your screen, this button is empty.

Smaller: Reduces the size of the map window with a factor 2.

Redraw: Redraws the contents of the map window.

Exit editor: Leaves the editor and keeps all changes.

The button bar can be hidden or shown with the Button Bar command on the Options menu. If the action of a certain button cannot be performed at a certain moment, the button appears gray.

5.11 Sample set editor

5.11.1 Functionality

In the sample set editor you can select sample pixels also called training pixels for certain classes prior to an image classification. The sample set editor has a menu bar, a context-sensitive menu, a button bar and a status line.

Sampling creates a sample set which is needed for a multi-spectral image classification. Sampling is the assignment of class names to groups of pixels which have similar spectral values and that are supposed to represent the classes that you want to obtain from the classification. The sampled pixels or training pixels are thus supposed to be characteristic for a certain type of a natural resource. For instance, to perform a land use classification, you might sample the classes: forest, grass land, arable land etc.

Requirements

For sampling you need an image which can be easily interpreted (e.g. a color composite), a map list, that is the set of images which you want to classify in a later stage, and a class domain containing the set of class names that you want to assign to training pixels. All maps must have the same georeference (or georef none).

To start the sample set editor, refer to Help topic How to create a sample set.

General working of the sample set editor
- select one or more pixels on the 'background' image
- assign a class name for the selected pixels
- view sample statistics
- view feature spaces

During sampling, you probably need to zoom in on the map. You can still add new classes to the domain while sampling. It is advised to use the same domains as far as possible (not every class has to be used).

☞ If you have an existing map of the area, you can add this map to the pixel info window. This may help you to select training pixels during sampling.
☞ You can create dependent output maps with the Classify operation (various methods, various parameters) using the current sample set as input. When you add these dependent maps to the pixel info window, you may already see the results of classifying during sampling.
As pixel info works on XY-coordinates in maps, all maps should be georeferenced.

Selection of pixels
- to select a pixel, click it; or move the pixel selection cursor with the arrow keys on the keyboard and press the space bar;
- to select all pixels within a selected area: drag a box with the left mouse button. All pixels in the box are selected;
- to add pixels to a selection: press and hold down Ctrl and click the pixels you want to select. When finished, release the Ctrl key.
- to clear a part of a selection: press and hold down Ctrl+Shift, click pixels or drag a box around pixels: these pixels are deselected. When finished, release the Ctrl+Shift keys.
- to toggle between select and deselect: press and hold down Shift, click pixels or drag a box around pixels: selected pixels are deselected, and non-selected pixels are selected. When finished, release the Shift key.
Inspect the Sample Statistics to see the statistics of the current selection.

Assignment of a class name to a selection
- double-click a pixel and choose a class name from the list, or enter a new class name, or
- select multiple pixels, press the right mouse button and select Edit from the context-sensitive menu. In a small dialog box that appears you can choose a class name from the list or enter a new class name.
  Instead of using the context-sensitive menu, you can also choose Edit from the Edit menu in the normal menu bar.

When a new class is added, also a color can be selected. Class names in the domain that you are using can be as long as you want: set the width of the domain through the properties of the domain. Sampled pixels appear in the color of the assigned class in the background map; when you move the mouse over a sampled pixel, the statusline shows the class name of the pixel.

View Sample Statistics
Sample Statistics are displayed in a separate window. In the upper half of the window, you can select a class name, then some statistics are calculated for the training pixels belonging to this class: mean, standard deviation, number of pixels with the predominant value, predominant value, and total number of training pixels belonging to this class. In the lower half of the Sample Statistics window, statistics are shown for currently selected pixels.

View Feature Spaces
To view a feature space, press the right mouse button in the sample set editor, and select Feature Space from the context-sensitive menu. You can also click the Feature Space button in the button bar, or choose Feature Space from the normal Edit menu. Select which bands you want to be displayed by the feature space.
You can open as many feature spaces as you like, but as each of them is updated after a new selection of training pixels, speed may decrease. Feature spaces can be shown with or without additional grid lines, can be copied to clipboard and printed.

On the basis of the sample statistics and the feature spaces, you can for instance decide to sample more training pixels of a certain class, merge classes with too much overlap, delete classes, etc.

Exit the sample set editor
To exit the sample set editor, double-click the Control-menu box of the sample set editor window or the sample statistics window. You can also click the Exit Editor button in the button bar, or choose Exit from the File menu in the sample set editor.

To merge existing classes
When two classes of training pixels are found very similar, based on the Sample Statistics and the Feature Spaces, you may decide to merge these classes.

In fact, training pixels of one class are merged together with the training pixels of another class.

▪ from the Edit menu or from the context-sensitive menu, choose Merge Classes.

The Merge Classes dialog box appears.

To assign training pixels to another class
▪ reselect the pixels that you to assign to another class, and
▪ from the Edit menu or from the context-sensitive menu, choose Edit.

The Edit Pixels dialog box appears. Assign the desired class to the selected pixels.

To rename a class
Renaming classes can be done in the domain Class editor. Open the domain from the Main window, and edit a class name into another class name. For more information, see also How to edit a domain and Domain Class/ID editor.

To delete one or more pixels from a class of training pixels
When by mistake some pixels were sampled and assigned to a certain class, you can remove these from the class by reselecting these pixels and assigning them the undefined value.

▪ in the sample set editor window, select the pixels that you want to remove from the class, and
▪ from the Edit menu or from the context-sensitive menu, choose Edit.

The Edit Pixels dialog box appears. Assign the undefined value (?) to the selected pixels.

To delete a whole class of training pixels
▪ from the Edit menu or from the context-sensitive menu, choose Delete Class.

The Delete Class dialog box appears, select a class of training pixels to be deleted. Training pixels of the selected class are removed from the sample set, but the class remains in the domain. To also remove the class from the domain, first delete the training pixels of the class, then delete the class from the domain in the domain Class/ID editor.

To change the color of a class
▪ from the Edit menu, choose Representation.

The Representation Class editor is opened where you can edit the colors of the classes.

5.11.2 Sample set editor Menu commands

File	Open Pixel Information
	Exit Editor
Edit	Cut
	Copy
	Paste
	Delete
	Edit ...
	Feature Space ...
	Delete Class ...
	Merge Class ...
	Representation
Layers	*see Pixel editor*
Options	*see Pixel editor*
Help	*see Pixel editor*

Context-sensitive menu

Select Area
Edit ...
Feature Space ...
Delete Class ...
Merge Class ...
Legend
Representation
Exit Editor

5.11.3 Sample set editor Button bar

The button bar of the sample set editor largely resembles the button bar of a normal map window; there are extra buttons to open feature spaces, to obtain a legend of the classes of training pixels and to exit the editor.

The following actions can be performed:

Entire Map: Displays the entire map in the map window.

Zoom In: Zooms in on a selected spot or area in the map. The mouse pointer changes into a magnifying-glass. Click to zoom in on a spot of interest, or drag the pointer from one corner of interest to another (the mouse pointer changes into a little box).

Zoom Out: Zooms out directly from the center of the displayed map with a factor 2.

Larger: Enlarges the size of the window with a factor 2. If this would not fit on your screen, this button is empty.

Smaller: Reduces the size of the window with a factor 2.

Redraw: Redraws the contents of the map window.

Feature Space: Opens the Feature Space dialog box to display a new feature space. A feature space visually shows the separation of classes of sampled pixels. You can open as many feature spaces as you like.

Legend: Shows a legend of the classes of sampled training pixels in a secondary window.

Exit editor: Leaves the editor and keeps all changes.

The button bar can be hidden or shown with the Button Bar command on the Options menu. If the action of a certain button cannot be performed at a certain moment, the button appears gray.

5.12 Annotation editor

5.12.1 Functionality

The Annotation editor allows you to insert new annotation, and to position, size and change display options of existing annotation. The Annotation editor has a button bar and a context-sensitive menu.

Annotation that can be handled by the Annotation editor includes:
- texts, legends, boxes, North arrow, scale bar, grid lines, graticule, bitmaps or metafiles (pictures) from disk,
- ILWIS maps copied to the clipboard, can be pasted as a picture into another ILWIS map window,
- any picture or bitmap copied into the clipboard from another Windows application program can be pasted into an ILWIS map window.

For more information, see How to add annotation to a map window.

To start the Annotation editor
The Annotation editor is automatically started when a new annotation layer is added to a map window. To start the Annotation editor from a map window, open the Edit menu and choose Annotation.

To insert more annotation
- click one of the add annotation buttons in the button bar of the Annotation editor (the status line gives an explanation), or
- press the Ins key on the keyboard, or
- click the right mouse button in the map window, and choose Add Annotation from the context-sensitive menu, or
- from the Layers menu, choose Add Annotation, or
- from the Layers menu, choose Layer Management and click the Add Annotation button.

To change the display options of an annotation layer

In the Annotation editor, you can double-click texts, legends, boxes, a scale bar, a North arrow, bitmaps and pictures: a Display Options dialog box appears in which you can directly change the settings of the double-clicked 'object'. Grid lines or a graticule cannot be double-clicked.

To obtain a Display Options dialog box, you can also:
- open the Layers menu, choose Display Options and select an annotation layer, or
- select an annotation layer by clicking it, and press the Enter key on the keyboard, or
- open the Layers menu and choose Layer Management. The Layer Management dialog box appears, or
- click the right mouse button in the map window from the context-sensitive menu and choose Layer Management. The Layer Management dialog box appears.

In the Layer Management dialog box, select an annotation layer and click the button 'Display Options', or simply double-click an annotation layer. A Display Options dialog box appears in which you can change the settings of the selected layer.

☞ After changing display options of an annotation layer, you might need to redraw the map window: click the Redraw button .

To position annotation
- click an annotation 'object' with the left mouse button, and hold the left mouse button down,
- drag the selected annotation 'object' to another location,
- then release the left mouse button.

Grid lines and a graticule depend on the georeference of the map window and can only be positioned by changing their display options.

To size annotation
- select an annotation 'object' by clicking it: the borders of the annotation become visible,
- position the mouse pointer on one of the 2, 4 or 8 size handles (little black blocks appearing at the annotation borders),
- drag the size handle to a new position.

Dragging one of the corner handles maintains the original ratio of height to width ratio. Dragging one of the middle handles resizes the annotation horizontally or vertically; the height to width ratio changes.

To delete an annotation layer
- select an annotation layer by clicking it: the borders of the annotation becomes visible,
- press Del on the keyboard, or
- click the right mouse button and choose Delete from the context-sensitive menu.

You can also delete an annotation layer through Layer Management.
Grid lines or a graticule can only be deleted through Layer Management.

To save annotation
When finished editing annotation, you can save the map window as a map view. In the Annotation editor or in the map window, open the File menu, and choose the Save View command or the Save View As ... command.

To exit the annotation editor
- double-click the Control-menu box, or
- in the button bar, click the Exit Editor button , or
- choose from the File menu, choose Exit Editor.

☞ To create more space in a map window for annotation, select the Extend Window command from the Options menu. In the Annotation editor, you can also choose Extend by Percentage or Extend by Coordinates from the context-sensitive menu.

☞ When pasting a bitmap into an ILWIS map window which displays a map that already uses 256 colors, the pasted bitmap may loose its colors. When this occurs, you might consider using 16 color bitmaps.

5.12.2 Annotation editor Menu commands

File	Save View
	Save View As...
	Exit Editor
Edit	Cut
	Copy
	Paste
	Delete
	Add Annotation ...
Layers	*see Pixel editor*
Options	*see Pixel editor*
Help	*see Pixel editor*

Context-sensitive menu

Select Area
Extend by percentage...
Extend by coordinates...
Add Annotation ...
Delete
Layer Management

5.12.3 Annotation editor Button bar

As the button bar of the Annotation editor is quite long, it is displayed here in two parts. The first part is identical to the button bar of a map window. The second part are the special buttons of the Annotation editor and are used to add more annotation to the map window. If your map window does not show all buttons, you can zoom in and then size the map window by dragging its right border.

The following actions can be performed:

Entire map: Displays the entire map in the map window.

Zoom In: Zooms in with a factor of 2 on a selected spot or area in the map. The mouse pointer changes into a magnifying-glass. Click somewhere in the map to zoom in on this spot, or drag the mouse pointer from one corner of interest to another (the pointer changes into a little box).

Zoom Out: Zooms out directly from the center of the displayed map with a factor 2.

Larger: Enlarges the size of the window with a factor 2. If the enlarged window would not fit on your screen, this button is empty.

Smaller: Reduces the size of the window with a factor 2.

Redraw: Redraws the contents of the map window.

Add Text: Add a text as an extra annotation layer to the window. The Display Options -Text dialog box follows.

Add Legend: Add a legend as an extra annotation layer to the window. If you have multiple data layers in your map window, the Map Layer Selection dialog box follows. Further, the Display Options - Legend (Class) dialog box follows when you want to add a legend of a class map and the Display Options - Legend (Image/Value) dialog box follows when you want to add a legend to a value map.

Add Grid Lines: Add grid lines, a map border or only coordinates as text as an extra annotation layer to the window. The Display Options - Grid Lines dialog box follows.

Add Graticule: Add a graticule as an extra annotation layer to the window. The Display Options - Graticule dialog box follows.

Add Box: Add a box as an extra annotation layer to the window. The Display Options - Box dialog box follows.

Add Scale Bar: Add a scale bar as an extra annotation layer to the window. The Display Options - Scale Bar dialog box follows.

Add North Arrow: Add a North arrow as an extra annotation layer to the window. The Display Options - North Arrow dialog box follows.

Add Bitmap or *Picture*: Select a bitmap or a Windows metafile (picture) from disk and add it as an extra annotation layer to the window. The Add Bitmap or Picture dialog box follows.

Exit editor: Leaves the Annotation editor and returns to the map window.

The button bar can be hidden or shown with the Button Bar command on the Options menu. If the action of a certain button cannot be performed at a certain moment, the button appears gray.

☞ To save annotation, you need to save the map window as a map view: open the File menu in the Annotation editor or in the map window, and choose the Save View or the Save View As command.